CLAIMS

We claim the following invention:

1. A grid that monitors a design simulation to support design verification coverage analysis, comprising:

a monitor declaration that provides a unique name for the grid;

n ordered axis declarations wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that comprises two or more functional states of said functional attribute and has a corresponding axis variable;

one or more logic expressions that evaluate whether the design has achieved one or more of said functional states, said logic expressions set each one of said n axis variables to an integer value corresponding to said functional state when said logic expressions evaluate true; and

a grid declaration that converts said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design, said grid declaration also records a hit at said unique linear index value.

2. A system that monitors a design simulation using a grid to support design verification coverage analysis, comprising:

a monitor declaration that provides a unique name for the grid;

n ordered axis declarations wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that comprises

two or more functional states of said functional attribute and has a corresponding axis variable;

one or more logic expressions that evaluate whether the design has achieved one or more of said functional states, said logic expressions set each one of said n axis variables to an integer value corresponding to said functional state when said logic expressions evaluate true; and

a grid declaration that converts said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design, said grid declaration also records a hit at said unique linear index value.

3. A method that makes a grid that monitors a design simulation to support design verification coverage analysis, comprising:

providing a monitor declaration that provides a unique name for the grid;

providing n ordered axis declarations wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that comprises two or more functional states of said functional attribute and has a corresponding axis variable;

providing one or more logic expressions that evaluate whether the design has achieved one or more of said functional states, said logic expressions set each one of said n axis variables to an integer value corresponding to said functional state when said logic expressions evaluate true; and

providing a grid declaration that converts said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design, said grid declaration also records a hit at said unique linear index value.

4. A method that monitors a design simulation using a grid to support design verification coverage analysis, comprising:

declaring a monitor in a monitor declaration that provides a unique name for the grid;

declaring n ordered axes using axis declarations, wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that comprises two or more functional states of said functional attribute and has a corresponding axis variable;

evaluating one or more logic expressions to determine whether the design has achieved one or more of said functional states;

setting each one of said n axis variables to an integer value corresponding to said functional state when said logic expressions evaluate true; and

using a grid declaration to convert said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design and to record a hit at said unique linear index value.

5. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform a method that monitors a design simulation using a grid to support design verification coverage analysis, comprising:

declaring a monitor in a monitor declaration that provides a unique name for the grid;

declaring n ordered axes using axis declarations, wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that comprises two or more functional states of said functional attribute and has a corresponding axis variable;

evaluating one or more logic expressions to determine whether the design has achieved one or more of said functional states;

setting each one of said n axis variables to an integer value corresponding to said functional state when said logic expressions evaluate true; and

using a grid declaration to convert said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design and to record a hit at said unique linear index value.

6. A dependent claim according to Claim 1, 2, 3, 4 or 5 wherein said grid declaration maintains a map of hits at each linear index value determined during a simulation, and downloads said map to a database.

7. A dependent claim according to Claim 1, 2, 3, 4 or 5 wherein said unique linear index value is determined by multiplying the integer value of each said axis variable except the nth said axis variable by the product of the sizes of each higher-order axis than the axis to which said axis variable corresponds, summing the results, and adding the integer value of the nth said axis variable.

8. A dependent claim according to Claim 1, 2, 3, 4 or 5, wherein said monitor declaration, said axis declarations, said logic expressions, and said grid declaration are translated into a computer program comprising a higher-order software language using a parser.

9. A dependent claim according to Claim 8 wherein said parser further translates each said unique linear index value to a character string comprising a concatenation of character strings that correlate to said grid name and to each said functional state within said cross-product achieved by the design.

10. A grid that monitors a design simulation to support design verification coverage analysis, comprising:

a monitor declaration that provides a unique name for the grid;

n ordered axis declarations wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that comprises two or more functional states of said functional attribute and has a corresponding axis variable;

one or more logic expressions that evaluate whether the design has achieved one or more of said functional states, said logic expressions set each one of said n axis variables to an integer value corresponding to said functional state when said logic expressions evaluate true;

a grid declaration that converts said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design by multiplying the integer value of each said axis variable except the nth said

axis variable by the product of the sizes of each higher-order axis than the axis to which said axis variable corresponds, summing the results, and adding the integer value of the nth said axis variable, said grid declaration also records a hit and maintains a map of hits at each linear index value determined during a simulation, and downloads said map to a database; and

a parser that translates said monitor declaration, said axis declarations, said logic expressions, and said grid declaration into a computer program comprising a higher-order software language, said parser further translates each said unique linear index value to a character string comprising a concatenation of character strings that correlate to said grid name and to each said functional state within said cross-product achieved by the design.

11. A system that monitors a design simulation using a grid to support design verification coverage analysis, comprising:

a monitor declaration that provides a unique name for the grid;

n ordered axis declarations wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that comprises two or more functional states of said functional attribute and has a corresponding axis variable;

one or more logic expressions that evaluate whether the design has achieved one or more of said functional states, said logic expressions set each one of said n axis

variables to an integer value corresponding to said functional state when said logic expressions evaluate true;

a grid declaration that converts said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design by multiplying the integer value of each said axis variable except the nth said axis variable by the product of the sizes of each higher-order axis than the axis to which said axis variable corresponds, summing the results, and adding the integer value of the nth said axis variable, said grid declaration also records a hit and maintains a map of hits at each linear index value determined during a simulation, and downloads said map to a database; and

a parser that translates said monitor declaration, said axis declarations, said logic expressions, and said grid declaration into a computer program comprising a higher-order software language, said parser further translates each said unique linear index value to a character string comprising a concatenation of character strings that correlate to said grid name and to each said functional state within said cross-product achieved by the design.

12. A method that makes a grid that monitors a design simulation to support design verification coverage analysis, comprising:

providing a monitor declaration that provides a unique name for the grid;

providing n ordered axis declarations wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that

comprises two or more functional states of said functional attribute and has a corresponding axis variable;

providing one or more logic expressions that evaluate whether the design has achieved one or more of said functional states, said logic expressions set each one of said n axis variables to an integer value corresponding to said functional state when said logic expressions evaluate true;

providing a grid declaration that converts said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design by multiplying the integer value of each said axis variable except the nth said axis variable by the product of the sizes of each higher-order axis than the axis to which said axis variable corresponds, summing the results, and adding the integer value of the nth said axis variable, said grid declaration also records a hit and maintains a map of hits at each linear index value determined during a simulation, and downloads said map to a database; and

providing a parser that translates said monitor declaration, said axis declarations, said logic expressions, and said grid declaration into a computer program comprising a higher-order software language, said parser further translates each said unique linear index value to a character string comprising a concatenation of character strings that correlate to said grid name and to each said functional state within said cross-product achieved by the design.

13. A method that monitors a design simulation using a grid to support design verification coverage analysis, comprising:

declaring a monitor in a monitor declaration that provides a unique name for the grid;

declaring n ordered axes using axis declarations, wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that comprises two or more functional states of said functional attribute and has a corresponding axis variable;

evaluating one or more logic expressions to determine whether the design has achieved one or more of said functional states;

setting each one of said n axis variables to an integer value corresponding to said functional state when said logic expressions evaluate true;

using a grid declaration that converts said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design by multiplying the integer value of each said axis variable except the nth said axis variable by the product of the sizes of each higher-order axis than the axis to which said axis variable corresponds, summing the results, and adding the integer value of the nth said axis variable, said grid declaration also records a hit and maintains a map of hits at each linear index value determined during a simulation, and downloads said map to a database; and

translating said monitor declaration, said axis declarations, said logic expressions, and said grid declaration into a computer program comprising a higher-order software language, and translating each said unique linear index value to a character string comprising a concatenation of character strings that correlate to said

grid name and to each said functional state within said cross-product achieved by the design.

14. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform a method that monitors a design simulation using a grid to support design verification coverage analysis, comprising:

declaring a monitor in a monitor declaration that provides a unique name for the grid;

declaring n ordered axes using axis declarations, wherein n is at least 1, each said axis declaration names an axis comprising a first axis through a nth axis, wherein each said axis corresponds to a functional attribute of the design and has an axis size that comprises two or more functional states of said functional attribute and has a corresponding axis variable;

evaluating one or more logic expressions to determine whether the design has achieved one or more of said functional states;

setting each one of said n axis variables to an integer value corresponding to said functional state when said logic expressions evaluate true;

using a grid declaration that converts said n axis variables to a unique linear index value that corresponds to the cross-product of said functional states achieved by the design by multiplying the integer value of each said axis variable except the nth said axis variable by the product of the sizes of each higher-order axis than the axis to which said axis variable corresponds, summing the results, and adding the integer value of the nth said axis variable, said grid declaration also records a hit and maintains a map

of hits at each linear index value determined during a simulation, and downloads said map to a database; and

translating said monitor declaration, said axis declarations, said logic expressions, and said grid declaration into a computer program comprising a higher-order software language, and translating each said unique linear index value to a character string comprising a concatenation of character strings that correlate to said grid name and to each said functional state within said cross-product achieved by the design.